

## **MERRIAM MOUNTAINS SPECIFIC PLAN**

### **APPENDIX J**

## **ADDENDUM GEOTECHNICAL EVALUATION OF ROCKFALL POTENTIAL MEMORANDUM**

GPA 04-06; SP 04-006; R04-013; VTM5381; S04-035, S04-036, S04-037,  
S04-038; Log No. 04-08-028; SCH No. 2004091166

*for the*

## **RECIRCULATED ENVIRONMENTAL IMPACT REPORT**

**March 2009**

Note: Comments will be accepted on the entire appendix.



# Leighton and Associates, Inc.

A LEIGHTON GROUP COMPANY

June 26, 2008  
(revised July 23, 2008)  
(2<sup>nd</sup> Revision, August 25, 2008)

Project No. 040084-014

To: NNP-Stonegate Merriam, LLC  
27071 Cabot Road, Suite 106  
Laguna Hills, California 92653

Attention: Mr. Joseph Perring

Subject: Addendum Geotechnical Evaluation of Rock Fall Potential, Merriam Mountains,  
San Diego County, California

Reference: Leighton and Associates, Inc., 2006, Preliminary Geotechnical Investigation,  
Merriam Mountains Property, San Diego County, California, Project No. 040084-  
003, original dated September 27, 2002, revised November 9, 2006

## Introduction

In accordance with your request, we have prepared this report to further address potential rock fall issues at the Merriam Mountains project in northern San Diego County, California. Rock fall issues were addressed in the above-referenced report (Leighton, 2006). Our previous report identified a series of possible mitigation measures for rock fall issues that could be utilized during construction.

As part of this addendum evaluation, we have re-evaluated the potential rock fall hazards and have provided a preferred method of rock fall mitigation for the site. Additional observations by our geology staff and additional recommendations will also be required during the site grading and construction operations. This will ensure boulders that are judged to be a rock-fall hazard are removed and/or broken-up in place prior to downslope development of residential/commercial structures.

### Potential Rock Fall Issues

The Merriam Mountains project is a rugged and heavily vegetated site of approximately 2,300 acres. In order to evaluate the potential for rock-fall issues on future building pads, we plotted the site grading plan on an aerial photo base. Using the proposed site grading plan and large scale aerial photographs, two certified engineering geologists from Leighton visited the site to observe the hillsides located above future building pads and to map the limits of potential rock fall hazard zones.

As observed in the field, a majority of the boulder outcrops appear to be large intact rock masses or boulders that are located on flatter slope areas where rock movement will not be an issue. In other cases, there are places where loose boulders are located in areas of nested rock that limit the potential for rock falls. Based on our evaluation, most of the areas that contain abundant boulders with a potential to pose a rockfall hazard are located within the limits of the proposed grading and the boulders will be removed by planned grading operations.

There are however, approximately thirteen localized areas that will not be graded and are located above proposed building pads where rocks appear to have a potential to become dislodged. These areas have been mapped and are shown on the attached Plate No. 1 and summarized on Table No. 1. As shown on Plate 1, rockfall hazards outside the proposed limits of grading that may potentially affect building areas include thirteen areas designated as rock fall hazard areas, RF-1 through RF-13. These areas include one area above Lot 11, areas above Lots 21, 48, 49, 112, 113, one area above Lots 25 and 675 and Lot M, and areas above Lots 776-779, Lots 855-860, Lots 866-871, Lots 1000, 1001, 1014, a portion of Meadow Park Lane, and portions of Merriam Mountains Parkway.

### Proposed Mitigation

Rockfall mitigation was addressed in the Leighton and Associates, Inc., 2006, Preliminary Geotechnical Investigation. The report identified mitigation measures for rock fall issues that could be utilized during construction. The following discussion has been provided to further clarify specific measures that may be used for each location that may represent a potential for rockfall.

All of the areas that were observed to have potential rockfall hazards are located either within the proposed development area or within the proposed fuel treatment zones where some disturbance is anticipated. While grading is not proposed in the fuel modification areas, disturbance would include brush trimming and thinning along with localized equipment access to remove debris. It should be noted the EIR considered vegetation within the fuel modification area impacted and mitigation for impacts to vegetation has been provided in Section 3.2 of the EIR. A copy of the Fuel Treatment Modification Map is attached as Figure 1 (EIR Figure 1.1-23A). Because disturbance of these fuel treatment zones is already anticipated from clearing we recommend that the boulders in these potential rock fall hazard areas be removed in conjunction with grading for the pad sites and roadways. If removal of the rock is not possible, the hazard may be mitigated





by breaking up the rock in place to reduce the potential for the rock to be dislodged to less than significant for the rock to be dislodged (see *Table 1 Rockfall Mitigation Table*). This work should be done prior to construction of structures in downslope areas.

As part of the site clearing, the grading contractor should work with the Leighton field geologist to remove loose boulders that have a potential to become dislodged. In approximately thirteen isolated locations (see *Plate 1*), breaking the boulder in place and/or removal would ensure the rocks would not become dislodged. Specific recommendations can be made during the grading operations if breaking or anchoring is warranted (see discussion under “Alternative Methods” below).

In seven of the thirteen locations, removal of the boulders appears to be the most feasible option. These areas can be easily accessed by a large dozer or excavator tracking through the brush. It is anticipated, that the areas can be accessed with the dozer blade in the air to minimize disturbance and construction of an access road will not be required. Some localized disturbance is anticipated as the boulders are pushed/rolled into the proposed grading areas where they can be broken down and removed from the site. Large boulders that can not be easily dislodged by the strong forces applied by the grading equipment may be determined not to be a rockfall hazard and may be left in place. In some instances boulders with a large flat side may be flipped onto the flat surface where they are no longer have a rolling potential and can then be left in place per the recommendations of a State certified geologist.

In six of the thirteen locations, breaking the boulders in place appears to be the most feasible option. This may be accomplished by hand drilling and breaking of the rock until it is reduced in size such that it is no longer a hazard or split to large flat surfaces that eliminate the potential for rolling. The disturbance in these areas would likely consist of trampled brush and creation of rubble piles. Table 1 summarizes the area identified as potential Rock Fall Hazard areas along with the recommended mitigation for each rockfall hazard area.

In less accessible areas which are typically located well above the limits of planned grading there are localized boulders on the steeper slopes that also have a potential for rolling. In these areas, based on our conversations with several contractors we recommend that the boulders be broken up in place. This may be accomplished by hand drilling and breaking of the rock till it is no longer a hazard. This will be determined if the rock can be reduced in size such that it is no longer a hazard or if the rock is split to large flat surfaces that eliminate the potential for rolling. The disturbance in these areas would likely consist of trampled brush and creation of rubble piles. Table 1 summarizes the area identified as potential Rock Fall Hazard areas along with the recommended mitigation for each rockfall hazard area.





Table 1 - Rockfall Mitigation Table

Rock Fall Hazard Area	Acreage (approx.) <sup>1</sup>	Proposed Lots Or Affected Roadways	Recommended Mitigation Measure	Feasibility of Mitigation	Impacts due to Implementation Of Mitigation
RF-1	0.3ac	Merriam Mtns. Pky	Removal of Boulders	Boulders can be moved into grading area by heavy equipment, then broken down and disposed of. Site can be readily accessed from the adjacent graded slope.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-2	1.0ac	Lot 11, Street 15-A	Removal of Boulders	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.5 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-3	0.2ac	Merriam Mtns. Pky	Break Boulders In Place	Areas located on steep slope, boulders can be reduced utilizing hand drills and rock breaking methods	Areas accessed on foot and boulders to be reduced in size by use of hand held power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.10 acre would be disturbed.
RF-4	1.2ac	Merriam Mtns. Pky and Lots 48, 49, 112 and 113.	Removal of Boulders	Site can be reached with heavy equipment from an existing access road that is located approximately 150 feet away.	A dozer will be utilized to access the location of boulders to be removed. A dozer will need to track across about 600 feet of distance during boulder removal. It is anticipated that 0.3 acres would be disturbed from boulder removal.
RF-5	0.4ac	Lot 21	Removal of Boulders	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site



					is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.2 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-6	0.1ac	Lot 21	Break Boulders In Place	(see RF-3)	Areas accessed on foot and boulders to be reduced in size by use of hand held power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.10 acre would be disturbed.
RF-6a	0.3ac	Lot 21	Removal of Boulders	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-7	0.2ac	Meadow Park Lane	Break Boulders In Place	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.1 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-7a	0.3ac	Meadow Park Lane	Removal of Boulders	(see RF-3)	Areas accessed on foot and boulders to be reduced in size by use of hand held power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.15 acre would be





					disturbed.
RF-8	0.9ac	Lot 25 and Meadow Park Lane	Break Boulders In Place	(see RF-3)	Areas accessed on foot and boulders to be reduced in size by use of hand held power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.30 acre would be disturbed.
RF-9	1.1ac	Lots 1000, 1001, 1014	Break Boulders In Place	(see RF-3)	Areas accessed on foot and boulders to be reduced in size by use of hand held power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.30 acre would be disturbed
RF-10	0.4ac	Lots 866-871	Removal of Boulders	Site can be reached with heavy equipment from an existing access road that is located approximately 100 feet away.	A dozer will be utilized to access the location of boulders to be removed. A dozer will need to track across about 100 feet during boulder removal. It is anticipated that 0.2 acres would be disturbed from boulder removal.
RF-11	0.3ac	Lot 675 and Lot M	Removal of Boulders	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that fifty percent of the 0.3 acre area could be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-12	0.3ac	Lots 855-860	Removal of Boulders	Boulders to be removed are located along an existing access road within 40 feet of a graded slope.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road



					would be required.
RF-13	0.3ac	Lots 776-779	Removal of Boulders	Boulders to be removed are located along an existing access road within 30 feet of a graded slope.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded cut slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.

<sup>1</sup> Includes entire area with potentially hazardous boulders





### Impacts from Boulder Removal

The anticipated disturbance from boulder removal within the fuel modification zone is an estimated area of 3.15 acres, which includes providing access. The boulders would be removed in areas located within the Fuel Modification Zones (FMZ). The 537 acre FMZ is included within the project impact area as identified in Figure 1.1-23 of the EIR and discussed throughout the EIR. The EIR states the entire FMZ will be impacted and this is reflected throughout the analysis in the EIR. The total disturbance from removal of the boulders will result in disturbance of 3.15 acres, which is less than one percent of the total area of disturbance (1,135 acres) and mitigation is provided.

### Alternative Methods

In addition to the methods of mitigation proposed above, possible alternative methods may also be found feasible through future studies. These can include the use of cables to drag isolated boulders up or down existing slopes. The excavation of isolated areas next to a boulder and then embedding the boulder in the excavation, the use of deflection berms or catchment areas and various anchoring systems. These alternative methods are not proposed at this time but are potential options that may be utilized in the future per the recommendations of a State of California Certified Engineering Geologist upon review and approval by the County of San Diego. Any impacts associated with alternative methods will be evaluated at the time they are proposed.

If you have any questions regarding this letter, please do not hesitate to contact this office.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.



Michael R. Stewart, CEG 1349  
Vice President/Principal Geologist

Attachments: Figure 1 - Site Disturbance Map  
Plate No. 1 Rockfall Hazard Map

Distribution: (2) Addressee  
(2) Dudek, Attention: David Hochart





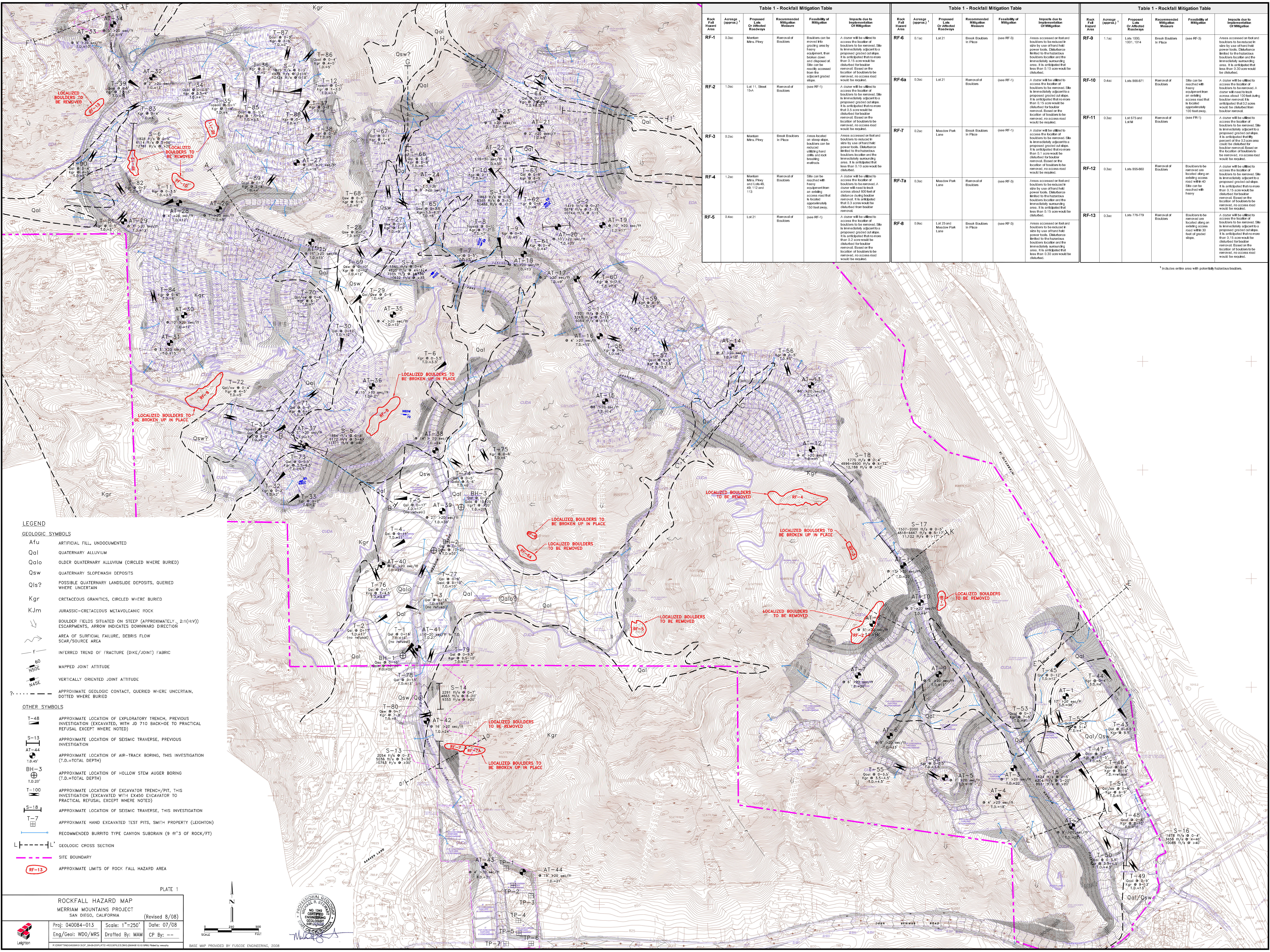


Table 1 - Rockfall Mitigation Table

Rock Fall Hazard Area	Acreage (approx.)	Proposed Lots Or Affected Roadways	Recommended Mitigation Measure	Feasibility of Mitigation	Impacts due to Implementation Of Mitigation
RF-1	0.3ac	Marden Mrs. Play	Removal of Boulders	Areas located on steep slopes, boulders can be removed into grading area by heavy equipment, then boulder down and disposed of. Site can be readily accessed from the adjacent graded slope.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-2	1.0ac	Lot 11, Sheet 15-A	Removal of Boulders	(see RF-1)	(see RF-1)
RF-3	0.2ac	Marden Mrs. Play	Break Boulders in Place	Areas located on steep slopes, boulders can be removed utilizing hand tools and rock breaking methods.	Areas accessed on foot and boulders to be removed in size by use of hand tool power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.10 acre would be disturbed.
RF-4	1.2ac	Marden Mrs. Play and Lots 48, 49, 112 and 113	Removal of Boulders	Site can be reached with heavy equipment from an existing access road that is located approximately 150 feet away.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.3 acre would be disturbed during boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-5	0.4ac	Lot 21	Removal of Boulders	(see RF-1)	(see RF-1)

Table 1 - Rockfall Mitigation Table

Rock Fall Hazard Area	Acreage (approx.)	Proposed Lots Or Affected Roadways	Recommended Mitigation Measure	Feasibility of Mitigation	Impacts due to Implementation Of Mitigation
RF-6	0.1ac	Lot 21	Break Boulders in Place	(see RF-3)	Areas accessed on foot and boulders to be removed in size by use of hand tool power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.10 acre would be disturbed.
RF-6a	0.3ac	Lot 21	Removal of Boulders	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-7	0.2ac	Meadow Park Lane	Break Boulders in Place	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-7a	0.3ac	Meadow Park Lane	Removal of Boulders	(see RF-3)	Areas accessed on foot and boulders to be removed in size by use of hand tool power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.15 acre would be disturbed.
RF-8	0.9ac	Lot 25 and Meadow Park Lane	Break Boulders in Place	(see RF-3)	Areas accessed on foot and boulders to be removed in size by use of hand tool power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.30 acre would be disturbed.

Table 1 - Rockfall Mitigation Table

Rock Fall Hazard Area	Acreage (approx.)	Proposed Lots Or Affected Roadways	Recommended Mitigation Measure	Feasibility of Mitigation	Impacts due to Implementation Of Mitigation
RF-9	1.1ac	Lots 1000, 1001, 1014	Break Boulders in Place	(see RF-3)	Areas accessed on foot and boulders to be removed in size by use of hand tool power tools. Disturbance limited to the hazardous boulders location and the immediately surrounding area. It is anticipated that less than 0.30 acre would be disturbed.
RF-10	0.4ac	Lots 566-571	Removal of Boulders	Site can be reached with heavy equipment from an existing access road that is located approximately 150 feet away.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed during boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-11	0.3ac	Lot 675 and Lot M	Removal of Boulders	(see RF-1)	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-12	0.3ac	Lots 505-509	Removal of Boulders	Boulders to be removed are located along an existing access road with 40' foot of graded slope.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.
RF-13	0.3ac	Lots 776-779	Removal of Boulders	Boulders to be removed are located along an existing access road with 30' foot of graded slope.	A dozer will be utilized to access the location of boulders to be removed. Site is immediately adjacent to a proposed graded at slope. It is anticipated that no more than 0.15 acre would be disturbed for boulder removal. Based on the location of boulders to be removed, no access road would be required.

\* Includes entire area with potentially hazardous boulders.